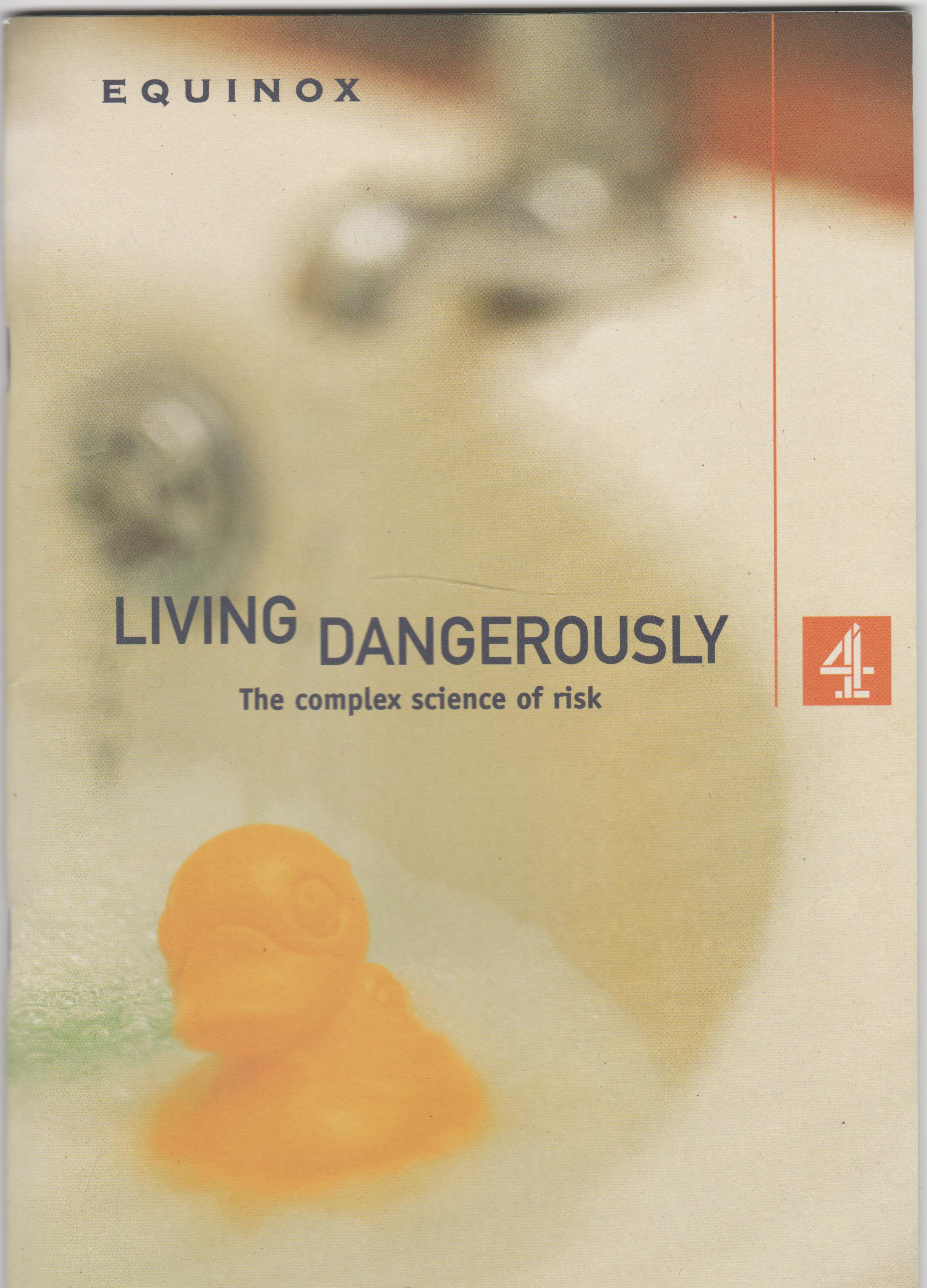


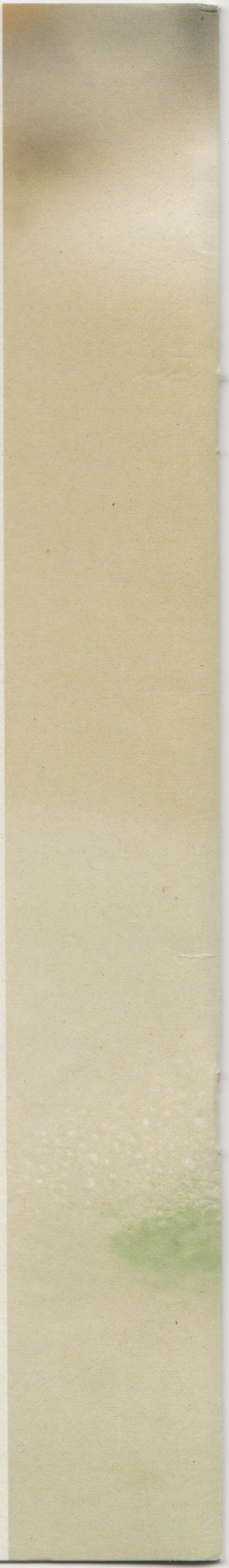
EQUINOX

LIVING DANGEROUSLY

The complex science of risk

LIFE IS full of risks, and modern science and media are making us increasingly aware of them. But despite – or sometimes even because of – the increase in information, our perceptions of risk are often badly distorted. So what can we do to get a clearer picture? What is risk/benefit analysis and how useful is it? Are we living in particularly dangerous times? And what makes some people take risks that others consider insane?

This booklet, published to accompany the Channel 4 *Equinox* programme *Living Dangerously*, provides some of the answers.



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EQUINOX

LIVING DANGEROUSLY

by Malcolm Burgess

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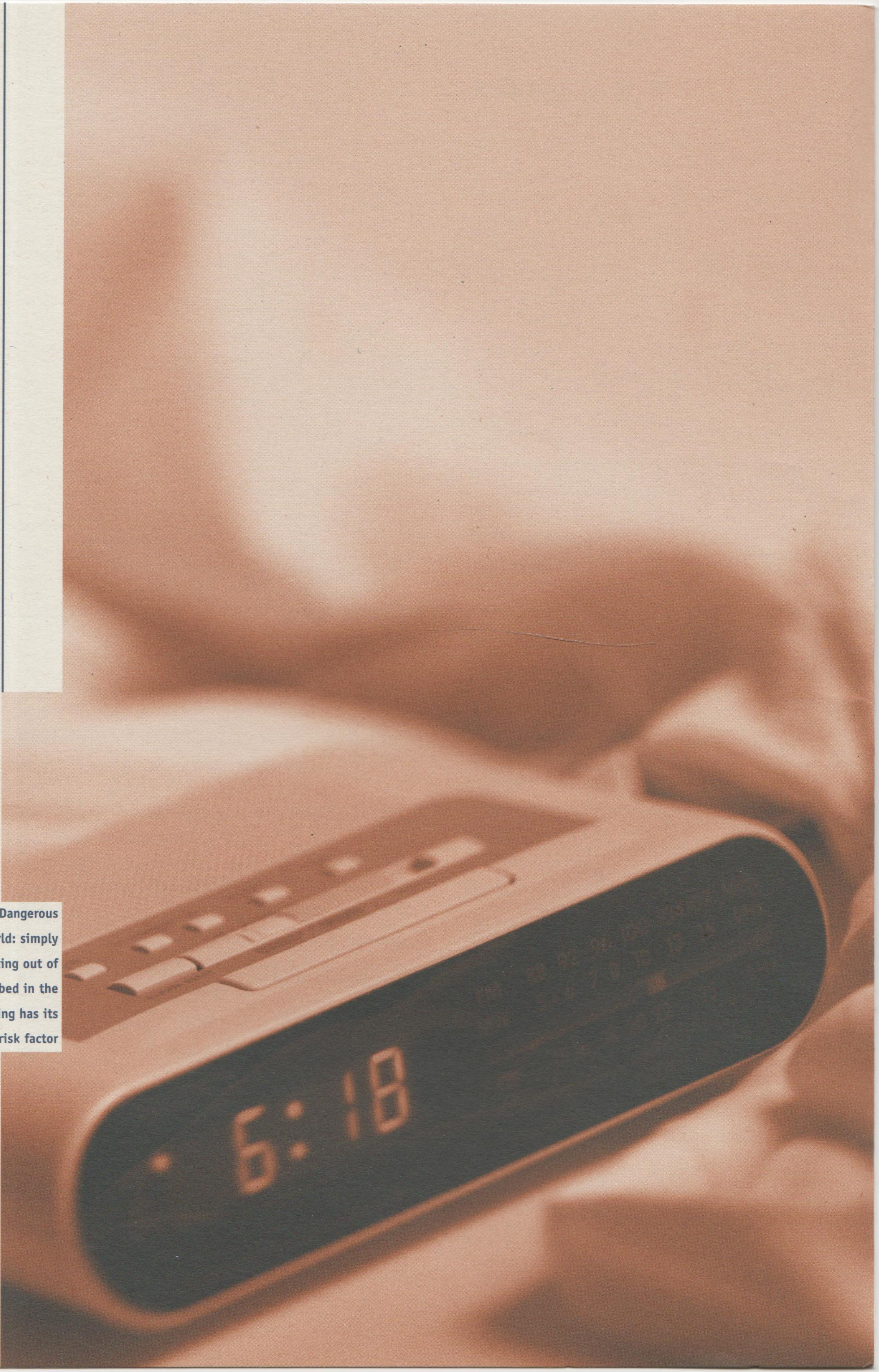


Dangerous world: simply getting out of bed in the morning has its own risk factor

INTRODUCTION: RISK AND CHOICE

WE LIVE in a world of risks, and we're more and more aware of them. Medical research and modern methods of data collection, storage and analysis have made a bewildering variety of risk statistics available.

Simply getting out of bed in the morning and getting dressed have their own risk factors. Each year in the UK, 20 people are electrocuted by bedside lights or alarm clocks, another 20 are killed falling over as they get out of bed and 60 are seriously injured putting on their socks. But if you think you can keep out of harm's way by staying in bed, think again. Every year 6,000 American adults manage to injure themselves on their bedclothes.

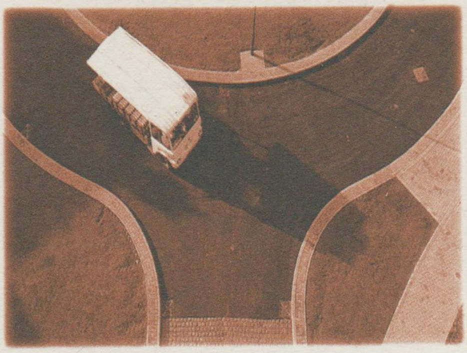
Such statistics, though interesting, are of little practical use. But others present us with crucial choices. For instance, the probability that a child will be born with Down's syndrome can now be estimated from blood tests early in pregnancy, presenting parents with dilemmas previous generations have not faced – not least whether to have the test in the first place.

Homes and castles: we see our houses and flats as places of refuge, but the home can be a perilous place

Early call? – every year in the UK, 20 people are electrocuted by their alarm clocks or bedside lights

Of course, science has itself reduced many risks. Only 50 years ago diphtheria, polio and tuberculosis were common life-threatening diseases in the UK. But clearly scientific and technological developments give rise to anxieties as well as solutions and choices, and it's often extremely difficult for the lay person to weigh up sophisticated or conflicting information. Taking an aspirin daily may help prevent heart attacks, but aspirin can also cause bleeding ulcers and other side-effects. The contraceptive pill has been shown to increase the risk of thrombosis (blood clots), but the risk of thrombosis in pregnancy is much greater: 60 per 100,000 as opposed to 13–30 per 100,000 (depending on the type of pill), according to the Committee on the Safety of Medicines. Post-war advances in herbicides and pesticides, it could be argued, have enabled more of the world's growing population to be fed, and some say that genetically modified foods could do the same. But a growing number of people are more concerned about the possible health risks.

3,000 Americans seriously injure themselves each year on their room deodorisers

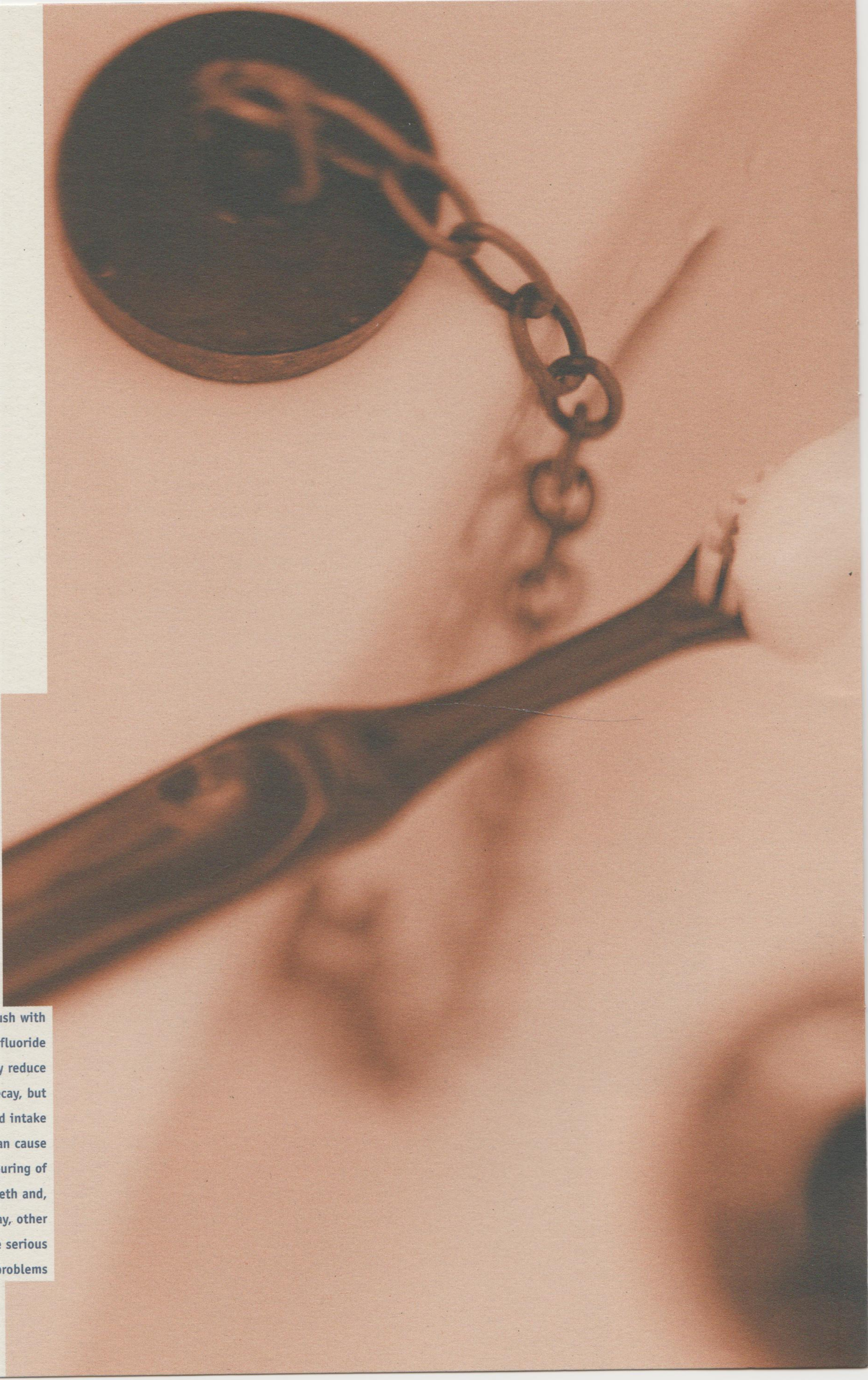


Such complexities underline the fact that assessing risk is only part of the equation: we also have to weigh up the benefits or possible benefits and judge whether they justify the risk. If the risk is great and the benefit small, or vice versa, the decision is probably straightforward. But the nearer the degree of risk and potential benefit approach each other, the harder the decision becomes. Moreover, it's not just a question of probability but of the nature of the danger and benefit. You're not likely to risk your life to win a toffee apple, whatever the odds. On the other hand, most people value the convenience of car travel so much that they are prepared to accept a high risk of serious injury or death.

Some people seek out risk; others do everything they can to avoid it, becoming reclusive or obsessed with hygiene, for example

It's also a question of personality. For a few people, the excitement of throwing themselves off a high building with a parachute is such that they accept a very high risk of death. In fact, the high risk is one of the crucial factors in the experience. At the other extreme, some people become so obsessed with safety that they become recluses.

The vast majority of us are somewhere in-between: we happily take what we feel to be acceptable risks, based on an assessment of the degree of risk and benefit. The trouble is that our assessments are often wildly inaccurate. This booklet looks at risk assessment and why we (and sometimes the experts) get it wrong, considers whether the world is becoming a more dangerous place, and surveys some of the research into what makes some people particularly prone to take risks.



A brush with risk? – fluoride may reduce tooth decay, but increased intake can cause discolouring of the teeth and, some say, other more serious health problems

> 'THE REVOLUTIONARY IDEA THAT DEFINES THE BOUNDARY BETWEEN MODERN TIMES AND THE PAST IS THE MASTERY OF RISK ... BY SHOWING THE WORLD HOW TO UNDERSTAND RISK, MEASURE IT, AND WEIGH ITS CONSEQUENCES, THE PIONEERS OF PROBABILITY THEORY CONVERTED RISK TAKING INTO ONE OF THE PRIME CATALYSTS THAT DRIVES MODERN WESTERN SOCIETY.'
>
> **PETER L BERNSTEIN** *AGAINST THE GODS: THE REMARKABLE STORY OF RISK*

MATHEMATICS AND MASTERY

Risk is expressed mathematically in terms of probability as a ratio or as a number between 0 and 1. An event with no chance of occurring has a probability of 0. The probability of rolling a six on a die is one in six or 0.167.

Modern ideas of probability and mathematical risk analysis go back to the work of Blaise Pascal and Pierre de Fermat in the 17th century. Using a problem concerning the possible outcomes of a dice game, Pascal and Fermat developed a method that could be applied to a wide range of other situations.

The problem was this: if a best-of-five dice game had to be abandoned when one of the players was leading two to one, how should the winnings be divided to reflect the likely outcome of the game? Pascal and Fermat looked at the four possible outcomes of the final two throws. Imagining Pascal and Fermat themselves as the players, the game would look like this:

WINS			**POSSIBLE WINS**		**OVERALL WINNER**
Throw 1	**Throw 2**	**Throw 3**	**Throw 4**	**Throw 5**	
Pascal	Fermat	Pascal	Pascal	Pascal	Pascal
			Pascal	Fermat	Pascal
			Fermat	Pascal	Pascal
			Fermat	Fermat	Fermat

In three cases out of four, Pascal would be the winner, so three-quarters of the winnings should go to Pascal and one quarter to Fermat.

'TO REJECT RISK IS TO REJECT LIFE. THE ONLY THING THAT IS FOLLOWED BY TOTAL CERTAINTY IS DEATH.' **GERALD WILDE,** PROFESSOR OF PSYCHOLOGY AT QUEEN'S UNIVERSITY, ONTARIO

By showing in this way how all possible future courses of events can be examined and given numerical values, Pascal and Fermat opened the doors to risk/benefit analysis and risk management.

While we may try to do this in our personal lives, governments and businesses do it in a much more sophisticated way to predict the future. From stockbrokers predicting the performance of a company to meteorologists weighing up the chances of severe weather to insurance experts working out how much a company should charge for a policy, a vast range of experts are employed to calculate odds and provide new models. The management of risk has become one of the most important businesses of the 20th century. It has been estimated that one-third of all United States government regulations involve risk management.

The big difference, however, between Pascal and Fermat and today's risk assessors is that while the former used pure mathematical reasoning, the latter base their assessments on data.

Chances of a Thai girl of 15 being a prostitute before the age of 30: 1 in 10

For example, using data on accidents and crime, an insurance company estimates the chances of your car being seriously damaged or stolen and sets a premium on the basis of this estimate. Many factors are involved, such as your age, the type of car you drive, the security measures you take, and the area in which you live – according to Automobile Association Insurance, you might have to pay at least twice as much to insure your car if you live in certain areas of Belfast as you would if you lived in Ipswich. In the case of life insurance policies, life expectancy tables are used, charting factors such as gender, age and occupation, based on a statistical survey of the population.

Similarly, governments wanting to evaluate new treatments for a disease must set up studies to weigh up the statistical risks and benefits. For instance, in the early 1950s Dr Jonas Salk developed a vaccine for polio, and the US Food and Drink Administration had to ascertain that the vaccine was safe. Once convinced that the vaccine posed a negligible risk, the Administration still had to confirm its effectiveness in a controlled trial, because any subsequent decline in the disease could otherwise be coincidental. The trial involved 400,000 randomly chosen children sharing similar standards of living. One group received the vaccine, the other a placebo. When results showed a markedly lower rate of polio in those who received the vaccine, it was made available to all children and a major disease was all but eradicated.

The importance of such work is obvious, but it should be remembered that risk/benefit analysis has its own limitations. Experts can only make estimates from the information collected, predict what is likely and give it a numerical value. The rest remains in the hands of chance. Much depends on the quality of the information, the rigour of the calculations and chance. No matter how small the risk (providing it is not zero) the event in question could still happen.

New medical treatments and procedures are one area in which risk/benefit analysis plays a vital role

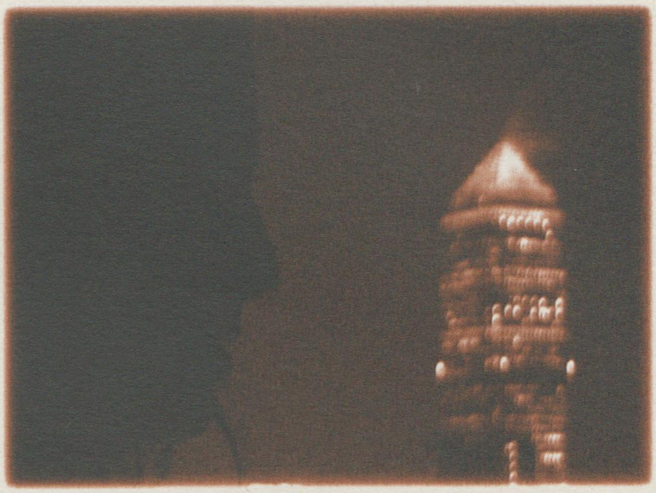
MISTAKEN PERCEPTIONS

For individuals, assessing risk tends to be much more hit-and-miss. We don't have the time or resources of governments or corporations to devote to analysing the risks and possible benefits related to choices in our lives. Even when the work has been done for us, we may be ignorant of the results. Our perceptions of risks are therefore often based on our personalities, preoccupations and experience – including what we read and hear. But unfortunately our sources are often unreliable. Contrary to popular myth, for example, lightning is *more* likely to strike twice in the same place, such as on exposed high ground.

The media are a major influence on our perception of risk (see also 'Dangerous Times?'). This is one reason why we are likely to overestimate risks outside the home, such as the risk of being mugged, and to underestimate domestic risks. Violent crime is news; domestic accidents, unless they happen to someone famous, are not. But in the US, for example, every individual has a 23% chance of being seriously injured at home and requiring emergency hospital treatment over the course of a year. Over a decade, 1 in every 100 adult Americans receives hospital treatment for a household scissors wound. And in the UK, two people a day die from falling down stairs.

Another important factor in the way we perceive and act on risk is the question of choice. Research shows that we are 1,000 times more likely to be happy with risks in voluntary activities than with risks that are imposed on us.

Danger on the streets? – we tend to overestimate risks outside and underestimate domestic risks



The table below quantifies just a few of the odds we may face in our lives.

Death by heart attack	1 in 4
Having asthma as a child	1 in 7
Seeking help for mental illness in your lifetime	1 in 8
Becoming dependent on alcohol	1 in 25
Choosing three balls in the Lottery	1 in 57
Having a serious fire at home	1 in 160
Death in a car accident	1 in 200
Death related to smoking 10 cigarettes a day	1 in 200
Death from a fall	1 in 380
Seriously injuring yourself on exercise equipment	1 in 400
Death while hang-gliding	1 in 560
Being allergic to a food additive	1 in 1,000
Death as a result of motorcycle racing	1 in 1,100
Death as a result of mountain climbing	1 in 1,750
Death from the 'flu	1 in 5,000
Death in a domestic accident	1 in 25,000
The next person you meet will be born the same day and year as you	1 in 25,000
Being murdered	1 in 100,000
Death from tampon-related toxic shock syndrome	1 in 1.4 million
Death by lightning	1 in 10 million
Winning the jackpot in the National Lottery	1 in 14 million
Being injured or killed in a single trip in a lift	1 in 17 million
Death as the result of a plane falling on you	1 in 25 million
Death as the result of a meteorite falling on you	1 in 1 million million

'FIND OUT WHAT THE LEVEL OF A RISK IS BEFORE YOU START WORRYING ABOUT IT. MERELY KNOWING THAT IT IS "STATISTICALLY SIGNIFICANT" SHOULD NEVER BE A CAUSE FOR ALARM.' **LARRY LAUDAN,** PROFESSOR OF PHILOSOPHY AT THE UNIVERSITY OF HAWAII

THE TROUBLE WITH STATISTICS

Even if we are aware of the mathematical probabilities and can set aside our own prejudices or misinformation, our problems are far from over.

For one thing, some risks are unavoidable. It's fortunate that the chances of death from being struck by a falling plane or a meteorite are remote, as there isn't a great deal you can do about it.

In addition, there's a lot to be said for Benjamin Disraeli's assertion that there are 'lies, damned lies, and statistics'. Statistics can be selected or manipulated to support different arguments or ways of looking at things. One possible way of doing this is to concentrate on relative rather than absolute risk or odds.

For example, the odds of winning the lottery with one ticket are 1 in 14 million. If you buy two tickets, you double your chances of winning – a 100% rise in the relative odds – but the absolute odds are still only 2 in 14 million.

The media often report only relative risks to make a story. A US newspaper headline speaking of deaths from rabies rising by 100% sounds alarming, but even in a bad year only one or two Americans die from the disease. The absolute risk is still minute.

Avoidable and unavoidable risk: the matador has a choice and a good chance of escaping injury. The bull doesn't.

Different lines: the danger of a major accident at a UK nuclear reactor is 1 in 10,000 or 1 in 10, depending on how you look at it

Other risk assessments can contain a hidden sting when more closely examined. For instance, according to a Central Electricity Board (CEB) estimate, the probability of a serious accident happening at a nuclear reactor is 1 in 10,000 – in other words, one accident every 10,000 years. This sounds reassuring, but there is another way of calculating the risk.

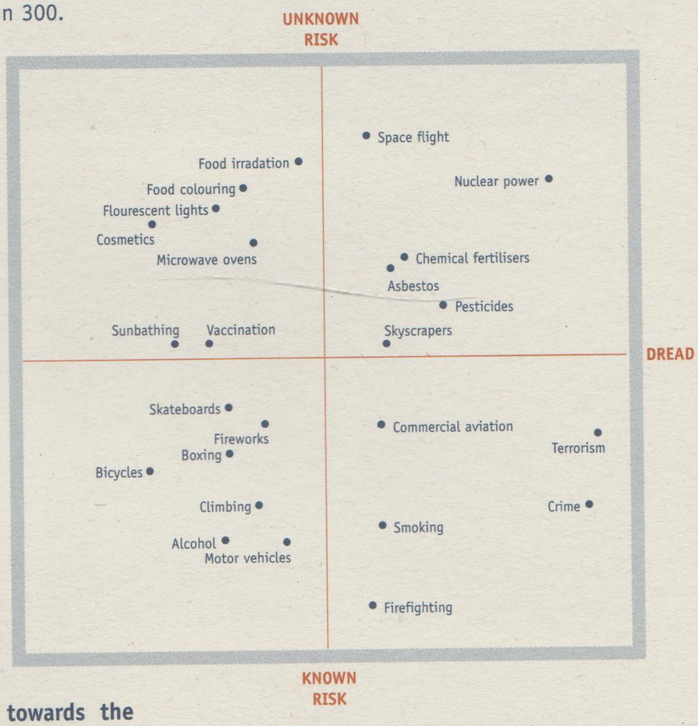
In an article for *New Scientist*, Ian Stewart, professor of mathematics at the University of Warwick, points out that the CEB risk figure of 1 in 10,000 (or 0.0001) per year applies to *each* British reactor. But there are 40 British reactors. The probability that at least one will have a major accident in any year should therefore be multiplied by 40, giving a figure of 0.004. This means that the probability of at least one serious accident in this country during the next 25 years is 25 times this, or 0.1. So the chances of a release of radiation, looked at in this way, are closer to 1 in 10.

10% of fertile couples wanting no further children use no method of birth control

Ignorance and inadequate data

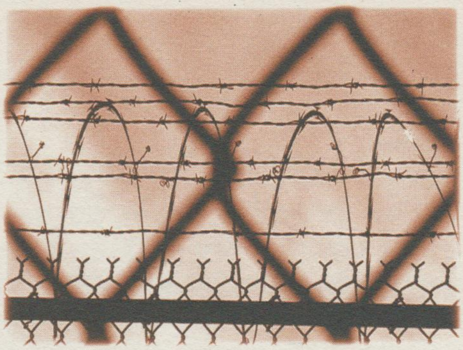
Risk estimates can also simply be wrong, for example because they are based on inadequate data or knowledge. Many involve guesswork. The real risks of nuclear power are in fact relatively unknown, because it is a comparatively new technology and there are relatively few reactors. A similar problem applies to space flight. Before the 1986 *Challenger* disaster, the officially estimated figure for an accident involving a space shuttle was 1 in 100,000. But the calculation didn't take into account the increased take-off risks involved in launching on a cold day. One expert later said the risk was probably closer to 1 in 300.

Perhaps not surprisingly, the fact that risks are relatively unknown may only increase our anxiety. The graph demonstrates that our fear of risks often bears little relation to whether or not they are quantifiable.



RISK AND DREAD

The vertical axis measures to what extent a risk is 'known'. For example, the extensive data about accidents in motor vehicles mean that the risks can be quite accurately assessed, whereas the degree of risk from food irradiation is not well understood. The horizontal axis records the degree of dread surveys report that people feel towards the various risks. So the graph shows, for instance, that although the risk from motor vehicles is clearly quantifiable, we fear them considerably less than pesticides or nuclear power, whose risks are much more uncertain. SOURCE: ROYAL SOCIETY

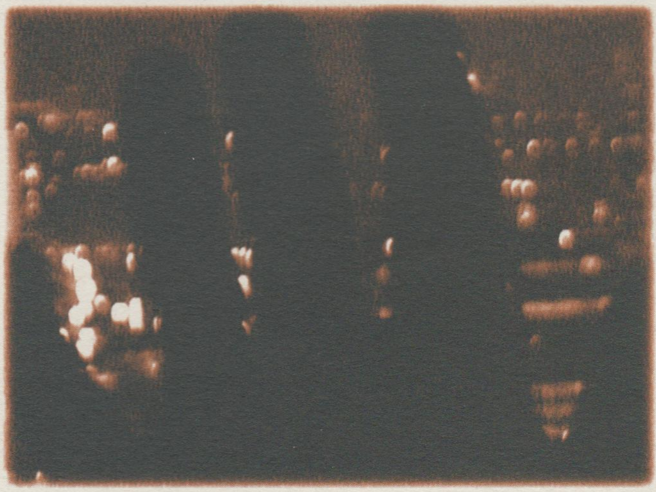


Correlation and causality

One important factor to bear in mind when assessing the weight that should be given to risk studies or reports is the difference between correlation and causality. Two events are correlated if one is often accompanied by the other. To find a correlation is simple: you see how regularly the two events occur together. Causality, on the other hand, means that one event results in another. To prove causality, scientists must pin down an entire chain of events, which is much more difficult.

For instance, over a number of years researchers pointed to some correlation between leukaemia clusters and proximity to British nuclear power stations. But some clusters were away from the plants, some had no clusters at all, and, as the number of cases was small, chance could have been operating. Only in 1990 was a causal link revealed: a University of Southampton study showed how exposure to radiation in men working at Sellafield appeared to have caused genetic damage in their children.

Room for caution remains, however. When scientists claim to have found a 'significant link', they usually mean that they are around 95% sure (working with the 5% margin of error usual in risk research) that two events are causally connected.



Variables

We tend to want simple answers when assessing risk, but the world is complex and many variables enter the calculations. Trying to take these variables into account is one of the main challenges professional risk analysts face.

Contrary to what some people clearly feel to be the case, flying is generally safer than driving – but we also need to consider how far we're flying, what kind of airline we use, what kind of driver we are and which make and model of vehicle we drive. In the USA if you fly 100,000 miles per year in large, commercial jets, your annual odds of dying in a plane crash are about 1 in 500,000. On commuter airlines, the risk is 10 times as great – about 1 in 50,000. And if you fly the same distance in a private plane or helicopter, the risk is about 1 in 5,000.

As for driving, a teenage male has been estimated to be about 40 times more dangerous than a 40-year-old woman. Women are generally safer drivers than men until about the age of 35, but men are safer after that.

Such variables are still more important if there is something we can do to influence serious risks. For example, factors such as what we eat, whether and how much we smoke and drink, and how much exercise we take all influence the risk of cancer, strokes and heart disease. But in many areas researchers have yet to come to a consensus on exactly what and how much we can do to reduce the risks. And it's easy to get some risks out of proportion. We stand a greater chance of choking to death on a rare steak than we do of dying from the carcinogens it contains, and similar carcinogens are everywhere in our diet, including naturally occurring types in fresh fruit and vegetables.

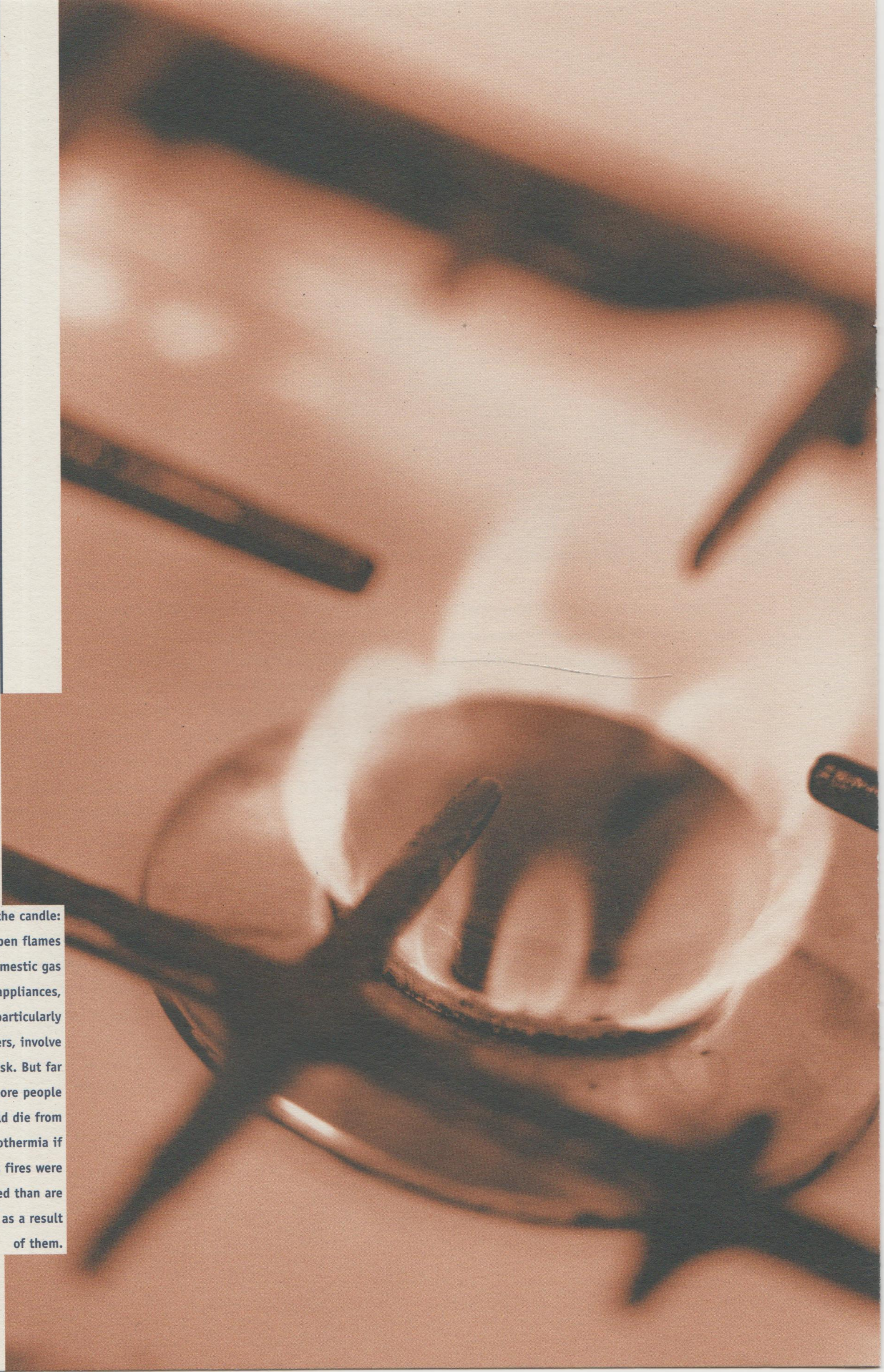
Wheels of misfortune: driving is particularly dangerous for young males – and anyone around them

Studies show that we tend to compensate for safety measures: if lines of sight are improved at a crossing, for example, people may take less care

Even if we reduce one risk factor, another could replace it. Far more people would die of hypothermia if the government banned gas fires than die in house fires or gas explosions because of them. Similarly, though there is good evidence that passengers in large cars are more likely to survive a crash than those in small cars, it has also been shown that someone used to driving a small car will tend to drive more quickly in a large one. This not only increases the driver's own risk of an accident but puts pedestrians, cyclists and small-car owners at greater risk too. Installing air-bags, seat-belts and anti-lock brake systems, designed to decrease risk, can also encourage motorists to drive at greater speeds.

Bearing all this in mind, perhaps it's not surprising that many of us just shrug our shoulders and trust to our instincts, however unreliable they may be. Certainly mathematics alone cannot tell us what is the right choice in a given situation. It can predict some of the dangers involved and provide information for analysis, but the rest is up to us.

You are 50% more likely to have a heart attack on Monday than on any other day of the week



Worth the candle: open flames and domestic gas appliances, particularly heaters, involve risk. But far more people would die from hypothermia if gas fires were banned than are killed as a result of them.

MOST RELEVANT indicators show that developed societies face far fewer life-threatening risks than ever before. In the UK and USA, accident rates are decreasing and life expectancy is increasing. Advances in medical science have enormously reduced infant mortality and the dangers of childbirth for women, and many major diseases have been all but conquered.

However, few of us seem to believe that the world is a safer place. One of the main reasons must be the media. Every day we are bombarded with anxiety-inducing stories about crime, medical scares, environmental problems and economic recession. Serious danger and risk seem to lurk everywhere – in everything from asbestos exposure and toxic residues in food to breast implants. In addition, reported risk factors are sometimes contradictory, causing further anxiety. For example, in 1996 the media reported different studies reaching different conclusions about whether or not there is a cancer risk from living close to a high-voltage power line.

Research shows that the media's emphasis on certain crimes or problems increases public expectations of danger. For instance, an alcohol-related death rarely rates a mention, but an ecstasy-related death can be major national news – partly because of the very rarity of the event. According to Alcohol Concern, an estimated 28,000–33,000 people die each year from alcohol-related causes; since 1985 the total number of deaths related to ecstasy is put at 60–70. Even a single well-reported incident can have a major impact on public perceptions of risk. One story about a terrorist incident involving US citizens in Greece led to a sharp decline in the numbers of American tourists coming to Europe, despite the fact that the risk of death in a terrorist attack is minute – far smaller, for example, than the risk of drowning in your bath.

Chances of US teenagers having their first experience of sexual intercourse in a car: 1 in 8

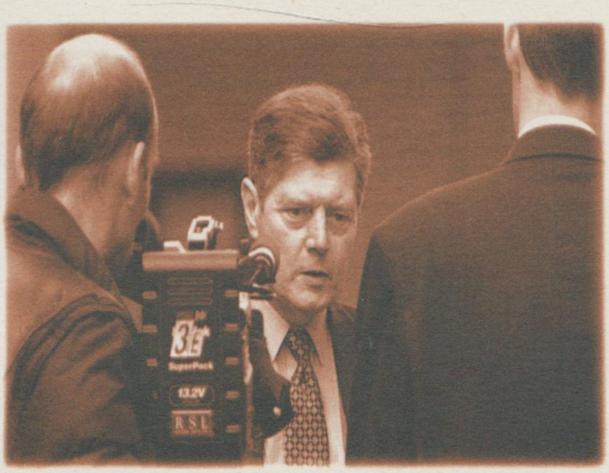
Double standards? – problems related to ecstasy are newsworthy, but alcohol is responsible for far more damage and deaths

'TODAY, THE DANGER LURKS IN THE PHOSPHATES IN OUR FAVOURITE DETERGENT; TOMORROW THE FINGER POINTS TO INSECTICIDES, WHICH WERE HAILED A FEW YEARS AGO AS SAVIOURS OF MILLIONS FROM HUNGER AND DISEASE. THE THREATS OF DEATH, INSANITY AND – SOMEHOW EVEN MORE FEARSOME – CANCER LURK IN ALL WE EAT OR TOUCH.' **E RABINOWITCH**, *BULLETIN OF THE ATOMIC SCIENTISTS*, 1972

The media's obsession with violent death and crime encourages the belief that society is out of control. It has been estimated that the average US teenager will see 10,000 violent deaths on TV by the age of 15, though most will never see a single real violent death in their entire lives. In the UK, too, reports and images of violent crime and murder proliferate, but the risk of being murdered is remote – 1 in 100,000. As for the common perception from imported crime shows that US police officers have extremely dangerous jobs, American farmers and truck drivers are far more likely to die as a result of their work.

In the 1990s sex is perceived by many to carry great risks, despite the fact that in many societies contraceptives have greatly reduced unwanted pregnancies and antibiotics can cure serious sexually transmitted diseases such as syphilis and gonorrhoea. Reports about the threat of AIDS and the connection between the contraceptive pill and thrombosis are one of the main reasons for this perception. But once again, the resulting fears may be out of proportion. The contraceptive pill is safer than most medications, even for smokers, and it's certainly safer than pregnancy, and in the developed world AIDS poses only a very small threat to those who avoid the obvious risks, such as unprotected sex with strangers and drug injections using shared needles.

Professor John Henry, who realised that teenager Leah Betts had died from excessive drinking of water after taking ecstasy. The majority of ecstasy-related deaths are caused by exhaustion, overheating and dehydration.



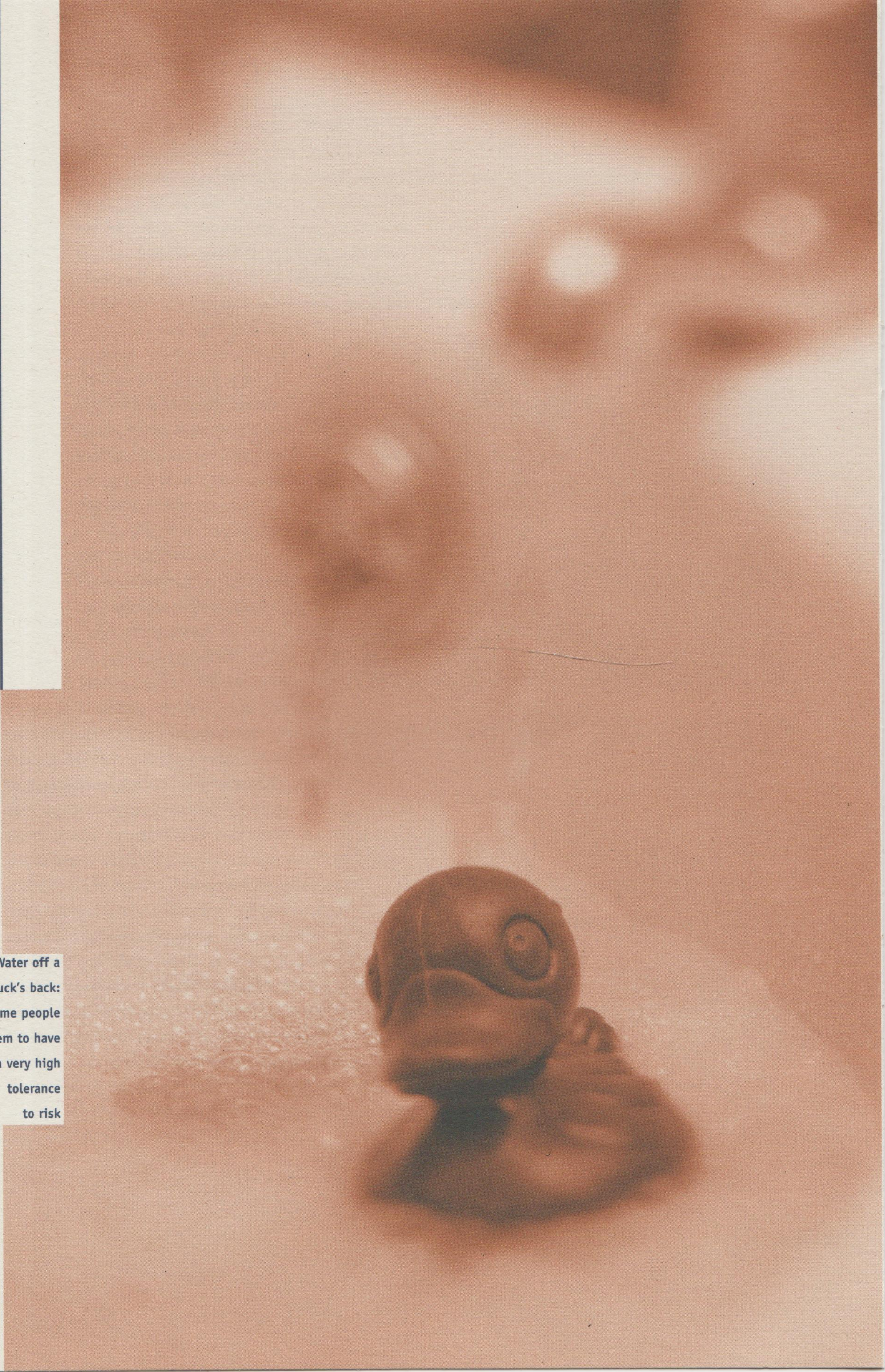
Women not using a condom on holiday: 1 in 5

So the media clearly influence our views. However, they also reflect them, and some commentators believe that our preoccupation with risk has a deeper source. In his book *Modernity and Self-Identity* the British sociologist Anthony Giddens, director of the London School of Economics, argues that fewer and fewer people can interpret the true nature of risks, even when there is a consensus among experts. 'The risk climate of modernity is unsettling for everyone and no one escapes. Many of the uncertainties which we face today have been created by the very growth of human knowledge.'

Other commentators take this idea further and see our preoccupation with risk and safety as defining characteristics of today's society. In his book *The Culture of Fear*, sociologist Frank Furedi of the University of Kent argues that our society has developed a negative 'victim culture' averse to the risk taking strategies of modern science and technology. He believes that an over-emphasis on precaution or possible harm to 'victims' leads to a view of human knowledge as creating problems rather than solving them – and this is reflected in, rather than created by, the media.

But though most of us want safety in much of our lives, it's often a different story when it comes to our leisure pursuits. Some people seek out safe or vicarious excitement with hair-raising rides in amusement parks or in thrillers both on film and in print. But the risks involved in some leisure activities are very real. So what makes some people risk their lives for fun?

Culture of fear: have we become over-obsessed with crime and security?



Water off a duck's back: some people seem to have a very high tolerance to risk

THE RAPIDLY expanding field of dangerous or 'extreme' sports is one area where risk taking is the prime reason for participation. New magazines such as *Adrenalin* and *Extreme* report on a wide variety of such sports, including BASE jumping (jumping with a single parachute off high fixed objects), extreme skiing (often involving cliff jumps), riding rapids and downhill mountain-biking.

What goes up ... but parachuting from high fixed structures is a very dangerous way of coming down

The chances of physical injury with such activities are predictably high. In 1995 more than 105,000 Americans were rushed for emergency treatment as a result of skating down hills at high speed. Some activities are so dangerous that participants rarely trouble hospital emergency services. 'There aren't many injuries in BASE jumping,' says US jumper Frank Gambalie. 'You either live or you die.' Nancy Pritchard, a well-known ice-climber, is realistic about the dangers of her sport: 'I expect to lose three to four friends a year.' But such are their popularity that dangerous sports now have their own Olympics, the X Games, coverage of which is beamed to 200 countries. Some observers predict that dangerous sports will be competing with such staples as football, baseball and basketball as the big spectator sports of the 21st century.

Many with close links to extreme sports attribute extreme risk taking behaviour to a society in which the trend is to eliminate risk. 'It's gotten to the point where there are no more swings on playgrounds,' says Michael Bane, author of *Over the Edge: A Regular Guy's Odyssey in Extreme Sports*. 'At the same time, people are saying, "Where's Indiana Jones?" People need adventures in their lives.'

'There should be risk in your life, like the salt in your soup,' says Professor Gerald Wilde. In fact, the salt in your soup could be a risk in your life – excessive salt intake increases the risk of heart disease and stroke.

'EVERYBODY HAS A KIND OF OUTER LIMIT. AS YOU APPROACH THAT OUTER LIMIT, IT'S ALMOST LIKE YOU KICK IN A CERTAIN LEVEL OF PROBLEM-SOLVING SKILL. YOU START USING 18 PER CENT OF YOUR BRAIN INSTEAD OF 16 PER CENT.'

MICHAEL BANE, *OVER THE EDGE*

Although some may see this tendency as negative or even suicidal, others suggest it has a positive side. In *Behavioural Expression and Biosocial Bases of Sensation Seeking*, Marvin Zuckerman argues that 'if these were real death wishers, they wouldn't bother with safety precautions. The "death wish" is a myth made up by those who aren't sensation-seekers, who can't understand the rewards.'

American psychologist Frank Farley studied extreme risk takers and constructed a personality model of the typical extreme athlete, which he calls 'type T-positive physical'. Type Ts tend to be highly extrovert and creative, with a craving for novelty and excitement. 'Big Ts may need a higher level of physiological arousal than others, and they need to take risks to get that arousal,' he says. Farley classifies innovators such as Albert Einstein and Francis Crick as 'type T-positive mental'. But he also argues there are negative type-T personalities, who may tend to become involved in activities such as crime, unsafe sex and drink-driving.

Type T-positive physical: do extreme athletes conform to a personality model?

Scientists are also now investigating the possibility of a biogenetic explanation for extreme thrill-seeking, involving a special gene that directs a need for intense excitement. In 1996 an article in the journal *Nature Genetics* reported that novelty seekers possess a gene that makes their brains especially responsive to the neurotransmitter dopamine. Later, teams of American and Israeli researchers found that this gene encodes instructions of the D4 dopamine reactor - the brain's so-called 'feelgood' site. 'It's the kind of site that gets hit when you take cocaine or have good sex,' explains Keith Johnsgard, professor emeritus of psychology at San José State University. Those who possess this gene may be very sensitive to the neurotransmitter's pleasure-inducing effects and thus want to maintain high dopamine levels. Dangerous sports are one way to keep it flowing.

Sensational shopping: high levels of the enzyme MAO B may heighten the impact of stimuli on the brain, so that everyday activities such as shopping may seen fraught with danger

As *Equinox* reported, other studies have found that people who tend to take high risks have brains with unusually low levels of the enzyme monoamine oxidase B (MAO B), which has a key role in regulating arousal, inhibition and pleasure. Low levels of MAO B could produce sensation-craving by dampening the impact of stimuli on the brain. This low arousability spurs people to engage in extreme risk taking behaviour. The connection between high risk taking and levels of the chemical serotonin in the brain is also currently being examined.

British men who don't know how to put on a condom: 1 in 5

On the other hand, Anthony Giddens sees extreme risk taking as very much a phenomenon of our times: 'Cultivated risk here converges with some of the most basic orientations of modernity. The capability to disturb the fixity of things, open up new pathways, and thereby colonise a segment of a novel future, is integral to modernity's unsettling character.'

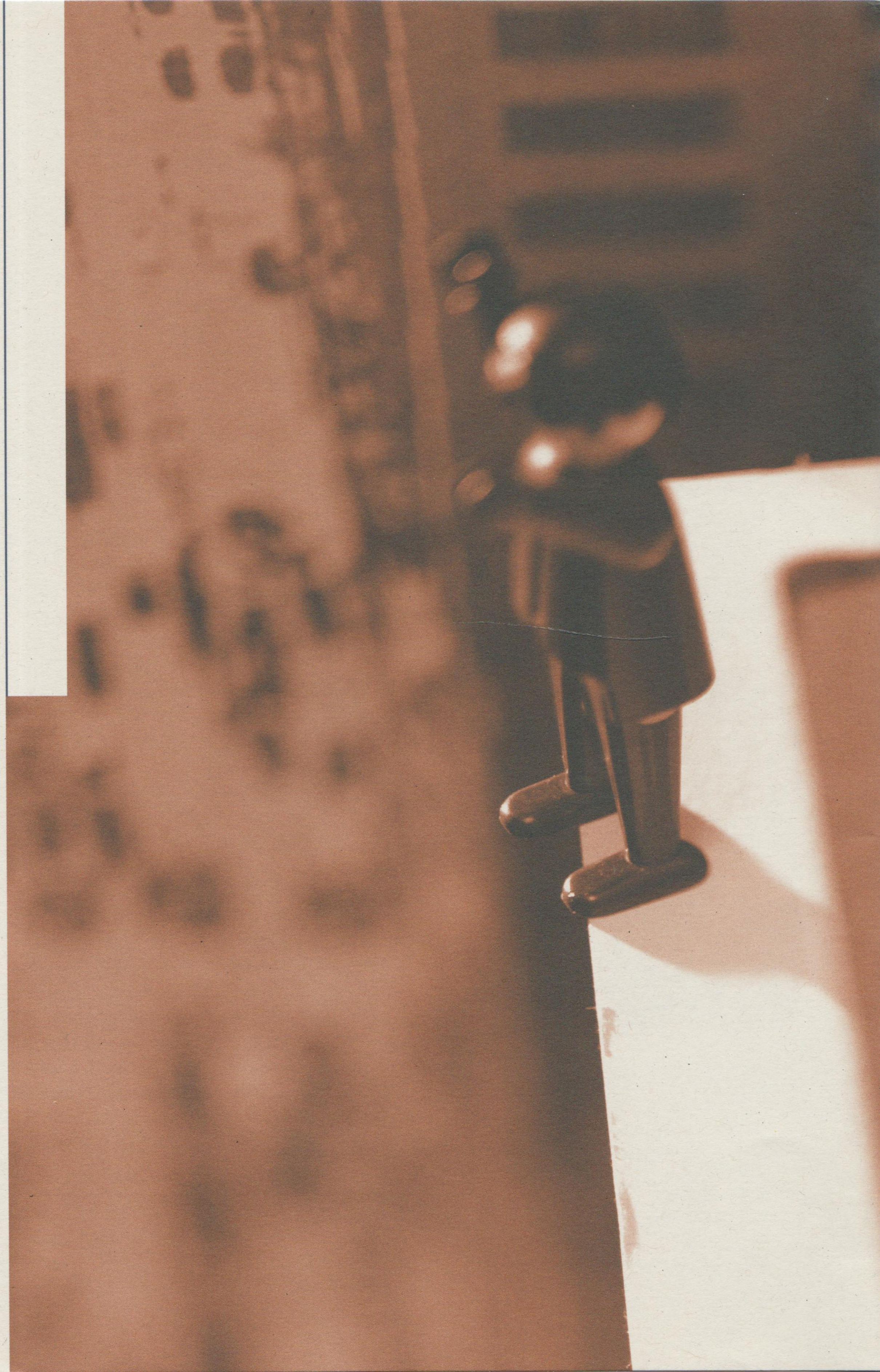
Is the explanation for high-risk behaviour psychological, physiological, or the effect of a society that attempts to reduce risk but engenders it through continuous change? Whatever the reason, extreme sports enthusiasts are probably more aware of the risks they take than most of us in our daily lives. Their reward, they say, is an ecstatic sense of being alive – at least in the short term.

CASE STUDY

Rupert, a computer chip designer, recently became the first person in Britain to jump naked off the four types of object required by BASE jumping (the acronym stands for Building, Antenna, Span and Earth). His chosen objects were the London Hilton Hotel, the Dartford Antenna, the Clifton Suspension Bridge and Cheddar Gorge.

So what is his motivation when death is certain if a parachute fails to open? 'It's not so much the jump, it's everything else about it – the situations it gets you into,' he says. 'It's a way of doing things, perceiving things, a way of being yourself, a way of freedom. When you're standing on the edge, there are lots of emotions going on. The adrenalin has been and gone. I find that I am very calm and focused. Being on the edge that fraction of a second before you jump, there is a wonderful feeling of commitment, composure and freedom. The edge is a great place to be – things on the edge make sense.'

DOUG BANE



'IT IS ONLY BY RISKING OUR PERSONS FROM ONE HOUR TO ANOTHER THAT WE LIVE AT ALL.' **WILLIAM JAMES**, *THE WILL TO BELIEVE*

ON THE SURFACE, most of us – and certainly society as a whole – generally seem to give a high priority to minimising risks. But would a risk-free environment, if it were possible, necessarily be the best of all possible worlds?

In *The Culture of Fear*, Frank Furedi argues that the rejection of risk taking, particularly in science and technology, could have serious implications for the future:

'If experimentation is discredited, society effectively acknowledges its inability to tackle and solve the problems which confront it. Throughout history, greater safety and security have always been the by-products of innovation and experimentation. Those who propose avoiding risks and gaining safety will invariably find that what they acquire instead are obsessions.'

But generally people are still prepared to take risks if they think the benefits justify them. Counterbalancing the proverbial wisdom advising people that it's 'better to be safe than sorry' and to 'err on the side of caution' are adages such as 'nothing ventured, nothing gained' or 'who dares, wins'. Moreover, it's clearly not only those who jump off skyscrapers who enjoy an element of risk. As Gerald Wilde, professor of psychology at Queen's University, Ontario, puts it: 'The art of life is not to reduce risk to zero but to take the right amount of risk, not too much, not too little. There should be a risk in your life, like the salt in your soup.'

The problem is that getting the balance right is extremely difficult. But though complete mastery of risk is probably an unattainable goal, the data and probability calculations now available to us at least give us an opportunity to try to make more informed decisions.

BOOKS

Against the Gods: The Remarkable Story of Risk by PETER L BERNSTEIN (Wiley 1998, £9.99). A highly readable introduction to the history of risk, revealing the movers and shakers who helped release humankind from the hold of superstition and fatalism.

Behavioural Expression and Biosocial Bases of Sensation Seeking by MARVIN ZUCKERMAN (Cambridge University Press 1994, £20.95). For anyone interested in personality research, an expert analysis of the reasons for sensation seeking, including participation in extreme sports.

The Culture of Fear: Risk Taking and the Morality of Low Expectation by FRANK FUREDI (Cassell 1997, £12.99). An examination of the roots and the consequences of contemporary risk consciousness.

Danger Ahead: The Risks You Really Face on Life's Highway by LARRY LAUDAN (Wiley 1997, £11.99). Crammed full of amazing facts and statistics about the risks and odds we all face every day.

Life by the Numbers by KEITH DEVLIN (Wiley 1998, £19.99). A fascinating and accessible account of the ways in which mathematical ideas find application in the world around us.

Modernity and Self-Identity: Self and Society in the Late Modern Age by ANTHONY GIDDENS (Polity 1991, £13.99). An analysis of modernity and its relation to the self, with an exploration of how we live in an environment of chance and risk.

Over the Edge: A Regular Guy's Odyssey in Extreme Sports by MICHAEL BANE (Macmillan 1996, £7.99). The author tests the breaking points of body and soul, whether running through Death Valley or bicycling in the Rocky Mountains.

Reporting on Risk: How the Mass Media Portray Accidents, Diseases and Other Hazards by ELEANOR SINGER and PHYLLIS M ENDRENY (Russell Sage Foundation 1993, £24.00). A whole range of media is surveyed to show how hundreds of different hazards are presented to the public.

ARTICLES

'Vital Statistics' by MARTIN BROOKES, *New Scientist*, 8 August 1998. Explores one of the most exciting cancer research projects of our time.

'Risk Watch' by MARK GREENER, *Health Which?*, April 1997. A useful introduction to absolute and relative risk.

'Risky Business' by IAN STEWART, *New Scientist*, 19 May 1990. A guide to risk assessment with some fascinating worked examples.

WEBSITES

ENVIRONMENTAL HAZARDS ASSESSMENT PROGRAM **http://www.ehap.musc.edu** The Medical University of South Carolina's programme to identify and address issues of environmental risk to human health.

'EXTREEEME', *US Online News* **http://www.usnews.com/usnews/issue/970630/30extr.htm** A fact-packed account of high-risk sports in America, plus links to other sites about extreme sports.

INTERNATIONAL OCCUPATIONAL SAFETY & HEALTH INFORMATION SERVICE **http://www.ilo.org/public/english/90travai/cis** A worldwide service dedicated to the collection and dissemination of information on the prevention of occupational accidents and diseases.

NEW SCIENTIST **http://www.newscientist.com** Many features and reports about risk can be found on the excellent *New Scientist* site.

RISK ANALYSIS CENTER **http://www.risk-analysis-center.com** Information about a wide variety of risks, from the remote to the ever-present. Includes an extensive directory of risk-related sites.

RISK LIST **http://home.clara.net/rlowther/risklist.html** Designed to help risk managers find relevant online starting points and risk resources for their research.

RISK WORLD **http://www.riskworld.com** News and views on risk assessment and risk management.

TARGET RISK **http://pavlov.psyc.queensu.ca/target** The full text of Gerald Wilde's book (see page 30).

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